“Smart Factory” in four steps using an MES

Initial situation
Numerous manufacturers must manage today’s increasing requirements of their customers and still prepare their production for Industrie 4.0. The latter often presents an immense challenge. A uniform solution is hardly possible as the starting point differs from company to company. However, the aim is clear for all: an efficient, flexible and sustainable production – in short the “Smart Factory”.

Solution
In order to transform any production systematically into a “Smart Factory” MPDV’s MES experts suggest an easy “Four-stage Plan”:

- Make your factory transparent by comprehensively collecting and evaluating data with a Manufacturing Execution System (MES) like HYDRA from MPDV.
- Transform your production planning and control into a reactive tool by integrating collected data into the MES planning process. Subsequently waste will be reduced.
- Incorporate your findings to create control cycles in production that lead to a self-regulating factory. MES HYDRA will support you.
- Functionally link all departments, resources and systems involved in the production process. This also requires product development to be directly connected to production.

Benefits at a glance
- Systematical and targeted approach – even for medium-sized companies.
- You can start at any stage.
- You can utilize existing machinery and installations.
- Investment phases are predictable and clearly structured.
- All employees can manage the migration to Industrie 4.0.
**Initial situation**
The production of ever smaller quantities coupled with the need for greater system availability is one of the challenges of tomorrow’s industry. This requires more flexible assembly and handling equipment and the capacity to plan required maintenance activities in advance. Therefore, networking and intelligent components are two key requirements of the Internet of Things (IoT).

**Solution**
With its valve systems from the Advanced Valve (AV) series and matching valve electronics in the Advanced Electronic System (AES), Aventics makes a dedicated contribution to the development of the Internet of Things.

The ultra-light, compact valve systems in the AV series support modularization, since they can be mounted decentrally near the actuators. This makes it possible to preassemble entire function groups without a control cabinet.

AES valve electronics with their I/O modules offer the option of generating status and diagnostic information locally and communicating it via the Ethernet network. All pneumatic valves, sensors, or actuators connected to the valve electronics can be linked to the higher level control with just two cables for power and communication.

The AES supports all conventional fieldbuses and Ethernet protocols for a seamless flow of data. The data also enables preventive maintenance — for enhanced system availability.

**Benefits at a glance**
- Lightweight, compact AV series valve systems facilitate modular engineering
- AES valve electronics meet demands for increased networking
- Enhanced system availability via condition monitoring
Initial situation
Implementation of Industrie 4.0 and IoT concepts comes with a wide range of requirements, particularly for machine diagnostics, including online and offline condition analysis, predictive maintenance, pattern recognition, machine optimisation or long-term data archival. As a result, seamless and cycle-synchronous data acquisition becomes a prerequisite for effective analysis and correction of processing errors in the machine. For this reason, Beckhoff has developed the TwinCAT Analytics tool to serve the growing needs of Industrie 4.0 applications.

Solution
Processing errors in machines generally create excessive cost and lost production time. The situation becomes all the more serious if there is a lack of machine data and production parameters for analysing processing errors and avoiding such errors in the future. The new TwinCAT Analytics tool can be used to rectify this information deficit by storing all process-relevant data in a cycle-synchronous manner. Data is stored in a standardised process data format with data compression, either locally in the controller, in a cloud-based solution on a server in the company network, or in a public cloud, as required.

Benefits at a glance
• Seamless online and offline analysis of machines and production data
• Storage and analysis of data directly on the local control, in private networks or in the public cloud

Machine diagnostics and predictive maintenance

Based on comprehensive and cycle-synchronous data recording, the new TwinCAT Analytics solution enables seamless online and offline analysis of machines and production data.